



From Real-Time Insights to
Automated Action

Connecting **Every** Miner. **Every** Asset. **Every** Zone.

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The Challenge:

Underground mining operations generate vast amounts of operational data every second. However, data alone does not improve safety, productivity, or efficiency.

The real value lies in transforming operational information into intelligent decisions that are automatically executed where the work takes place.

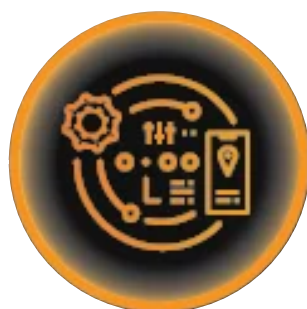
As mines become more connected and increasingly automated, operations require more than monitoring; they require intelligent control capable of understanding context, responding in real time, and coordinating infrastructure, equipment, and people through a unified operational platform.

What is Intelligent Control?

HELIX Intelligent Control is MST's intelligent automation capability that transforms operational awareness into autonomous action.

Powered by the HELIX enterprise software platform and executed through the distributed intelligence of the AXON infrastructure, Intelligent Control continuously analyses information from personnel, vehicles, equipment, sensors, and industrial systems to automatically execute operational responses across the mine.

Rather than simply generating alarms or displaying information, Intelligent Control enables mining operations to respond automatically to changing conditions, improving safety, productivity, energy efficiency, and operational consistency.



The Power of Intelligent Control



3D Connect
Interactive Spatial
Insights



Sentinel
Enhanced Safety
Monitoring



**Intelligent
Control**
Process
Automation



Smart Monitoring
IoT Network



Dispatch
Optimise Fleet
Management



Telemetry
Track Equipment
Health

HELIX serves as the operational brain of the mine ... capturing data, understanding context, and making intelligent decisions. AXON extends that intelligence into the field, executing those decisions through distributed edge computing and industrial control. Together, they deliver Intelligent Control: a unified platform that transforms operational awareness into autonomous action.

HELIX is the software platform responsible for collecting, contextualising, visualising, and analysing operational information from across the mining operation.

Through its advanced rule engine, HELIX converts real-time operational data into intelligent decisions.

- Centralised operational intelligence
- Real-time monitoring and visualisation
- Rule-based automation engine
- Geospatial decision-making
- Historical analytics and reporting
- Integration with IoT devices and third-party systems
- Customisable dashboards and workflows

AXON delivers HELIX intelligence directly into the field.

Distributed Edge Computing controllers execute automation logic close to the operational process, enabling immediate response while reducing latency and dependency on central systems.

- Distributed Edge Computing.
- Low-latency automation.
- High availability.
- Reliable operation in harsh underground environments.
- Local execution of automation rules.
- Continuous operation even during communication interruptions.



How Intelligent Control Works?

A Continuous Cycle of Operational Intelligence.

Intelligent Control continuously captures, analyses, and responds to operational events in real time. By integrating software intelligence with field-level execution, it enables mining operations to react faster, automate critical processes, and continuously improve performance.

1. Capture:

- Operational data is collected from personnel, vehicles, mobile equipment, environmental sensors, industrial devices, IoT systems, and communications infrastructure.

2. Understand:

- HELIX analyses operational context, identifying what is happening, where it is occurring, who is involved, associated risks, and which operational rules apply.

3. Decide:

- The Intelligent Control engine determines the optimal operational response using configurable business logic, geospatial intelligence, and event-driven automation.

4. Execute:

- AXON Edge Controllers immediately execute approved actions directly within the mine by controlling connected infrastructure and industrial equipment.

5. Learn

- Every event, decision, alarm, and action is recorded, creating valuable operational intelligence that supports continuous improvement.



From Operational Intelligence to Autonomous Action:

Built on the combined strengths of the HELIX enterprise platform and the AXON intelligent infrastructure, Intelligent Control delivers the core technologies required to automate, monitor, and optimise critical mining processes in real time.

Core Capabilities:

- Rule-based operational automation.
- Context-aware decision making.
- Geospatial intelligence.
- Distributed Edge Computing.
- Real-time monitoring and control.
- Industrial protocol integration.
- Open architecture for third-party systems.
- Historical event recording and analytics.
- Scalable automation across the entire mining operation.

Intelligent Control provides a flexible automation framework that can be applied across a wide range of mining processes. By combining operational intelligence with field-level execution, HELIX and AXON enable safer, more efficient, and more autonomous operations throughout the mine.

Typical Applications

- Ventilation on Demand.
- Pump Automation.
- Automated Traffic Management.
- Door and Access Control.
- Environmental Monitoring.
- Power Management.
- Emergency Response Automation.
- Asset Protection.
- Industrial Process Automation.



Key Benefits:

Turning Operational Intelligence into Measurable Business Value.

By combining HELIX's operational intelligence with AXON's distributed field execution, Intelligent Control delivers measurable improvements in safety, productivity, energy efficiency, and operational performance across the entire mining operation.

- Improve personnel safety through automated operational responses.
- Reduce manual intervention and human error.
- Increase operational productivity and equipment utilisation.
- Improve energy efficiency through intelligent infrastructure control.
- Reduce operating costs by automating repetitive processes.
- Accelerate decision-making with real-time execution.
- Provide a scalable platform ready for AI, Digital Twins, IoT, and advanced analytics.
- Protect existing investments through open integration with industrial systems.

Why MST?:

Unlike traditional automation solutions that separate software from field execution, MST delivers a fully integrated Intelligent Control ecosystem.

HELIX provides enterprise-level operational intelligence, while AXON executes those decisions through distributed industrial infrastructure deployed throughout the mine.

Together they create a single platform that transforms operational awareness into safer, smarter, and more autonomous mining operations.



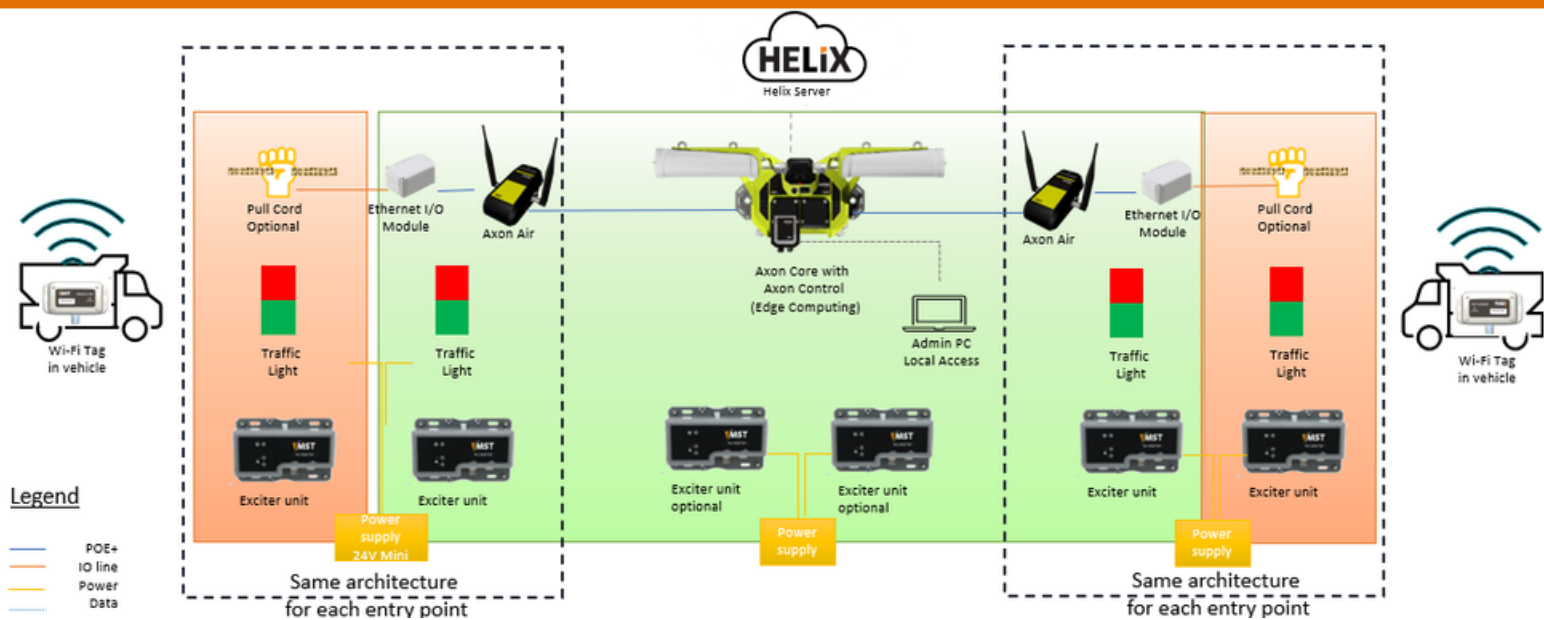
Use Case: Smart Monitoring Enables Intelligent Traffic Control.

One of the best examples of HELIX Smart Monitoring in action is MST's Traffic Control solution. Traffic Control relies on continuous monitoring of underground intersections, vehicle movement and signalling equipment to provide the operational awareness required for intelligent traffic management.

HELIX Smart Monitoring continuously collects and presents this operational information within HELIX, while HELIX Intelligent Control applies configurable automation rules to safely manage underground traffic flow.

MST's Traffic Control solution can transform underground traffic management at intersections:

- Traffic automation through intersections, reducing congestion and risk of incidents by conventional use of manual traffic control solutions e.g. pull cords.
- Tracking of vehicles and personnel passing through intersections and review historical events for incident investigation.
- Supporting manual controls (pull cord) as a fall-back solution for vehicle and personnel without a tracking tag.
- Able to implement complex traffic and signalling scenarios using HELIX Automation's rule engine.
- Each intersection can store its own set of control rules locally, using AXON Control's edge computer to process individual scenarios at the edge ensuring low latency and independent operation from the main server.
- Ability to reset traffic lights from within the HELIX platform by the main control centre or by underground support personnel with remote access to HELIX.
- Compatible with any existing analogue block lights (Green/Red). Supporting additional lock lights where required i.e. pedestrian traffic indicators.
- Feature-rich roadmap that will continue to unlock more value through the product's lifecycle.
- Customisable system with ability to solve a broad range of mine traffic use-cases.
- Scalable and designed to be implemented across both underground and surface intersections, MST's Traffic Control solution provides a comprehensive deployment plan that includes data collection, implementation of agreed logic, and a trial period to ensure success.



Required Devices:

MST's Traffic Control can leverage existing analogue lights at the mine site or provide new block traffic lights as part of the traffic control hardware kit. The kit also includes an AXON Control module as the edge control unit, AXON Air access points, AXON Core digital network platform or AXON Dock as optional mounting solution for customers that have a third party network backbone with POE connectivity at the intersections.

Software:

- HELIX
- Automation Module.

Hardware:

- Wi-Fi tags (vehicles & personnel) Analogue traffic lights
- AXON Air (Wi-Fi access point)
- AXON Core with AXON Control module Exciter units and optional Power Supply

How the System Works:

- Tracked vehicles are fitted with Wi-Fi tags.
- Two exciters are placed at each intersection entry point to detect incoming vehicles and their direction of travel.
- Additional exciters can be installed along the intersection for better tracking granularity.
- Approaching vehicles with onboard Wi-Fi tags will be detected at the nearest intersection entry point, triggering the set traffic rules in the AXON Control that is connected to local network at that intersection.
- Below is a simple illustration showing scalable entry/exit points of an intersection, along with MST hardware.

Improve Safety:

- Reduces risks and accidents associated with manually triggered traffic light controls.
- Review historical events for investigations and improvements.

Increase Efficiency:

- Minimise intersection congestion and delays.
- Reduce operating costs.
- Increase productivity.

MST's Traffic Control solution offers a customisable set of traffic and signalling scenarios using HELIX Automation's rule engine.

Scenario 1 / Straight Route:

In this simplest scenario a vehicle approaches the intersection at any entry point, the traffic light turns green at the entry point and Red at the other end.

- This allows the vehicles to traverse the intersection.
- Once through, the lights switches to green for the next vehicle to pass through.

Scenario 2 / T-Intersection:

Similar to Scenario 1 When the first vehicle enters the T-intersection, all lights immediately turn red, except the entry point which will be green, alerting other vehicle that the intersection is occupied.

- Once the first vehicle has exited the junction, all lights return to green (default status) until the next vehicle enters the junction.

Scenario 3 / Four-Way Intersection:

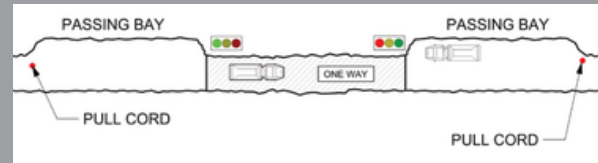
Another common scenario is a 4 way intersection where upon a vehicle entering an unoccupied intersection will trigger all other entry points lights to turn red.

- Once the vehicle has exited, all lights return to green (default status), allowing the next vehicle to enter the intersection.

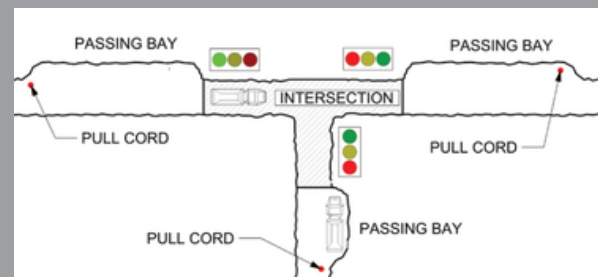
Further Examples:

Some other scenarios we support include:

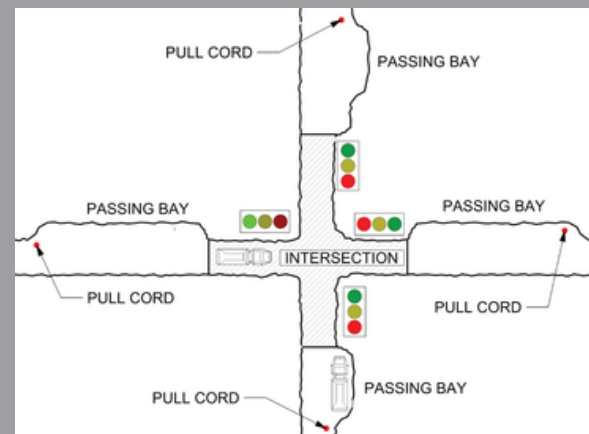
- Vehicle breakdown management in Intersection.
- Efficient handling of pedestrian and non-tagged vehicle traffic.
- Remote traffic control override capability.
- And many more, tailored to meet the unique requirements of your mine.



Scenario 1



Scenario 2



Scenario 3



Use Case: Smart Lighting Solution (SLS)

MST Global as part of the HELIX suite of automated solutions is delivering a next-generation Smart Lighting Solution that brings together advanced underground illumination with real-time digital intelligence. By integrating industrial-grade LED lighting with MST's HELIX platform, the solution enhances visibility while introducing a new layer of operational awareness across underground environments.

Designed for demanding conditions, SLS industrial-grade LED strip lighting provides consistent, glare-free illumination that replicates daylight-like visibility.

This improves working conditions, eliminates dark zones and supports safer navigation through underground roadways, tunnels and work areas.

Through integration with HELIX, lighting infrastructure is transformed into an intelligent, connected system.

Beyond illumination, it becomes a visual communication layer capable of delivering real-time alerts and operational signals directly within the mine.

Dynamic lighting cues can be triggered to support a range of applications, including vehicle movement alerts, traffic flow management, exclusion zone notifications and emergency signalling.

These highly visible alerts enhance situational awareness and provide immediate, intuitive guidance to personnel and vehicle operators.

By linking lighting to live operational data such as fleet movements and location-based events, the solution enables a more responsive underground environment.

Lighting can adapt in real time to changing conditions, helping to improve coordination, reduce risk and support faster decision-making.

The integration maximises the value of existing infrastructure by converting lighting networks into connected safety and productivity tools. With high-lumen output, energy efficiency and low maintenance requirements, MineGlow's lighting systems deliver reliable performance while supporting long-term operational efficiency.

As part of the broader HELIX ecosystem, the Smart Lighting solution strengthens digital mine capabilities by combining advanced illumination with intelligent signaling.

The result is a safer, more connected underground environment that supports improved operational control, communication and more effective incident response.



Other Key Use Cases include:

VENTILATION ON DEMAND

Ventilation on Demand (VoD) uses the HELIX Platform to continuously assess real-time operational conditions and adjust underground ventilation accordingly. HELIX collects and contextualises data from personnel and vehicle tracking systems, zone occupancy information, gas sensors, environmental monitoring devices and ventilation infrastructure to provide a clear view of where airflow is needed across the mine.

Through HELIX Intelligent Control, configurable rules can be established for different operating conditions. When personnel or vehicles enter a designated zone, or when gas and environmental readings reach defined thresholds, HELIX can automatically trigger the appropriate ventilation response. These decisions are then executed through connected AXON edge controllers and field devices, enabling fans, regulators or other ventilation equipment to respond quickly at the point of operation.

Rather than operating ventilation systems continuously at full capacity, VoD directs airflow only to active areas and adjusts ventilation as conditions change. When a zone is no longer occupied, or environmental readings return to acceptable levels, the system can reduce or redirect airflow in line with the mine's configured operating rules. This helps create a more responsive ventilation environment while maintaining visibility of system status, alarms and historical trends through HELIX dashboards.

POST BLAST & RESTRICTED AREA CONTROL

Post-Blast & Restricted Area Control. HELIX can automate post-blast re-entry by combining real-time environmental monitoring, personnel tracking and configurable control rules within a single operational platform. Following a blast, HELIX can use gas sensor values to monitor underground conditions and apply time-based or alarm-based clearance logic. Access controls and warnings remain active until the required clearance period has passed and sensor readings confirm that conditions are within predefined safe limits, helping prevent personnel from entering the affected area prematurely.

For broader restricted-area control, HELIX can use geospatial rules, tracking data and connected field devices to automatically manage access and issue warnings. When a person or vehicle approaches a restricted zone, the system can trigger visual alerts, traffic signals, access controls or operator notifications based on location, authorisation, gas levels and current alarm status. By preventing entry until underground conditions are confirmed safe, HELIX supports a more consistent and auditable approach to post-blast clearance, restricted-area management and operational safety.

KEY BENEFITS:

- Reduces reliance on manual intervention during emergencies and high-risk situations.
- Ensures automation rules are applied consistently across shifts and operators.
- Supports growing numbers of rules, zones, and use cases without operational complexity.
- Automated actions occur immediately when defined conditions are met.
- Automation is Scalable and delivers consistent results.
- Improved Safety and faster response times



Looking for solutions to improve safety, productivity, and operational performance in your mine?

www.mstglobal.com

- Visit the MST Global website to explore innovative technologies designed for underground mining and tunnelling.
- Discover integrated solutions for communications, automation, IoT, fleet management, personnel tracking, and digital operations, backed by real-world customer success stories, technical resources, product information, and the latest industry innovations.
- Whether you're evaluating new technologies or planning your next digital transformation project, MST Global provides the insights and expertise to help you make informed decisions.

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- Join our community and stay informed about the technologies shaping the future of mining.

YouTube channel:

- Explore MST Global's latest innovations in underground mining technology.
- Discover videos featuring communication networks, automation, fleet management, safety solutions, IoT, real-world customer success stories, product demonstrations, and digital technologies designed to improve mine safety, efficiency, and productivity.

Talk to our experts about how to improve underground safety and productivity with HELIX Intelligent Control in your mine.



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